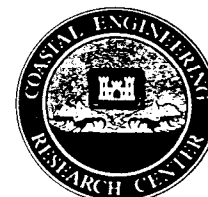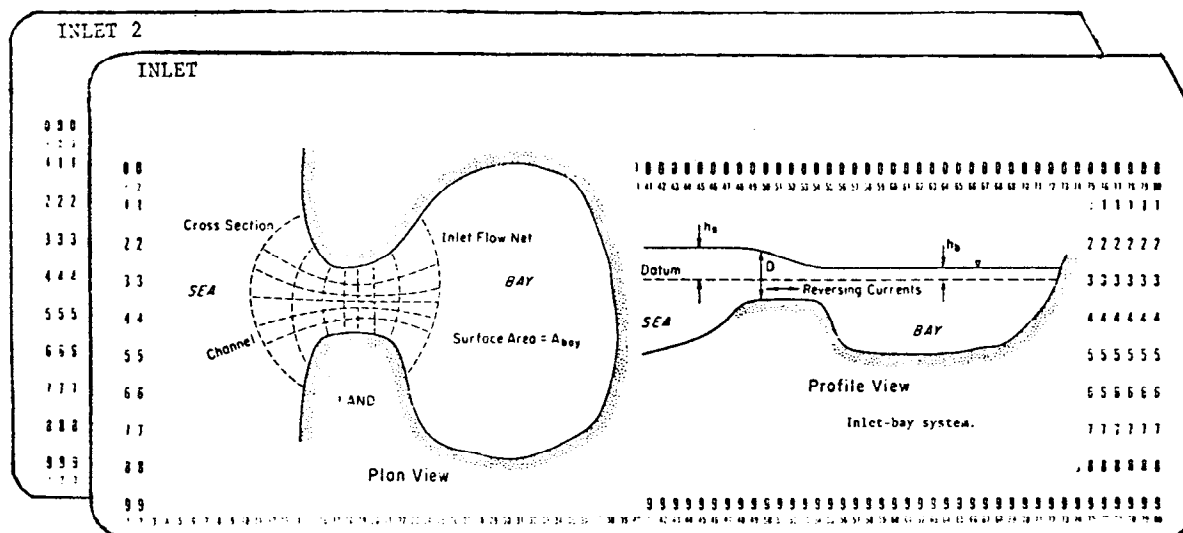*Coastal Engineering*

Technical Note

COMPUTER PROGRAM: INLET

PROGRAM PURPOSE: To calculate coastal inlet velocities and discharges, and bay surface levels as a function of time.

PROGRAM CAPABILITY: The "INLET" program is organized to accept up to 3 inlets connecting a bay to the sea; up to 7 different channel configurations for each inlet; and up to 8 normal cross-sections on each of 7 channels. Another computer program (INLET 2) is available for more complex systems of interconnecting inlets, bays, and seas. INLET 2 is an expanded version of INLET.

PROGRAM INPUT:

1. Geometry of the system (See Figure) including inlet depths; side slopes and surface area of the bay.
2. Water level fluctuations of the sea as a function of time.
3. Flow net of inlet (up to 7 channels with up to 8 normal cross-sections each).
4. Bottom friction (Manning's "n").

PROGRAM OUTPUT:

1. Summary table of grid dimensions, input parameters, and period of the system.
2. Summary Table: High and low water elevations, points of maximum discharge, and maximum velocity.
3. Optional:
        a. Summary table of instantaneous hydraulics.
        b. Pen plot of inlet hydraulics.

APPLICABILITY/LIMITATIONS:

This program is applicable under the following limitations:

1. The sea level is a specified function of time.
2. The bay water surface remains horizontal.
3. The bay is connected to the sea by one or more inlets.
4. At least one inlet must continuously connect the bay to the sea. Some areas of inlets may go dry during the water level cycle, and one or more inlets may go dry as long as one inlet continues to carry flow.
5. Bay water surface area is a (specific) function of local depth.
6. Inlet cross-sectional area is a (specific) function of local depth.
7. The local water level slope in the inlet is assumed to be linearly related to the local friction loss along the inlet.
8. There is a water level drop along the inlet that is proportional to the unrecovered velocity head lost through turbulent eddy diffusion in the bay or sea.
9. Storage of water in the inlet is negligible.
10. Wind stress on the inlet and bay surfaces in negligible.
11. Water has constant properties throughout the inlet and bay.
12. The interaction with wind waves is neglected.

The program can be used for sea level fluctuations caused by astronomical tides, storm surges, seiches, tsunamis.

Two examples of the application of this program area:

1. A tidal inlet on the ocean shoreline that is forced by an astronomical tide where inlet channel friction is a dominant term in the equation of motion; and
2. A Great Lakes inlet with river inflow forced by lake seiching where head, friction, and temporal and connective accelerations are important at different points in the water level fluctuation cycle.

PROGRAM AVAILABILITY: The card deck for INLET or INLET 2 may be requested by Corps of Engineers Offices from the Coastal Engineering Research Center ADP Coordinator, WESCD-A. The programs are written in FORTRAN for a CDC 6600 computer. One run generally costs less than $5 for a tidal cycle.

REFERENCES:

Seeling, W. N., "A Simple Computer Model for Evaluating Coastal Inlet Hydraulics," CETA 77-1, U.S. Army, Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA, July 1977.

Seeling, W. N., Harris, D. L., and Herchenroder, B. E., "A Spatially Integrated Numerical Model of Inlet Hydraulics," CITI Report 14, U.S. Army, Corps of Engineers, Waterways Experiment Station, Vicksburg, MS, Nov. 1977.